

## **Determination of variation in protein composition of raw milk of individual cows using capillary zone electrophoresis**

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The Dutch Milk Genomics Initiative aims to identify the genes that contribute to natural genetic variation in milk-quality traits, in particular milk-fat and milk-protein composition. To determine the possibilities of changing milk protein composition the variation in detailed protein composition of a large amount of animals has to be known. Previous research on variation in milk protein composition is very limited, often uses only a small amount of animals and uses various analyzing techniques. The technique used determines to a large extent the quality of the measurement and the degree of detail possible to measure. The aim of this study is to determine the variation in protein composition of raw milk of a large amount (2000) of Dutch Holstein Friesian cows using capillary zone electrophoresis (CZE).

With CZE we were able to simultaneously:

- 1) Separate and quantify the major milk proteins:  $\alpha$ -lactalbumin,  $\beta$ -lactoglobulin,  $\alpha_{s2}$ -casein,  $\alpha_{s1}$ -casein,  $\kappa$ -casein and  $\beta$ -casein with good reproducibility.
- 2) Separate proteins which differ in their degree of phosphorylation.
- 3) Separate minor proteins such as Bovine Serum Albumin and the proteins belonging to the  $\gamma$ -casein and proteose-peptone fractions.
- 4) Determine genetic variants of the major proteins including the rare  $\kappa$ -casein E variant.

Because of the technique used and the large amount of animals studied we were able to get a very detailed view on the variation in protein composition and the occurrence of genetic variants in Dutch HF cows. Large variation in protein composition between individual cows exists which offers great opportunities for steering milk protein composition by breeding.